

IN THE CLAIMS

Please cancel claims 1 and 2 without prejudice or disclaimer, amend claims 3, 6 and 7,
and add claims 9 through 11, as follows:

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Claims 1 and 2. (Canceled)

1 3 (currently amended). [[The]] A redundant array of inexpensive disks level 5 memory
2 system, of claim 1, wherein comprising:

3 a plurality of defect-adaptive memory devices, each of said plurality of defect-
4 adaptive memory devices having a first region for sequentially storing parity information for
5 data recovery and a second region for storing data with the parity information needed for data
6 recovery [[is]] stored and [[is]] sequentially arranged from the most outer cylinder on a
7 recording medium in each corresponding one of said plurality of defect-adaptive memory
8 devices;

9 a plurality of caches, each of said plurality of caches respectively coupled
10 operatively to a corresponding single unique one of said plurality of defect-adaptive memory
11 devices, each of said plurality of caches adapted for storing parity information for data recovery
12 for a corresponding single unique one of said plurality of defect-adaptive memory devices to
13 provide one-to-one caching; and

14 a controller operatively coupled to each defect-adaptive memory device of said
15 plurality of defect-adaptive memory devices and to each corresponding single unique cache of

16 said plurality of caches, said controller selectively controlling writing and reading of parity
17 information needed for data recovery in said first region of each corresponding single unique
18 one of said plurality of defect-adaptive memory devices, selectively obtaining parity
19 information needed for data recovery from said first region of each corresponding single
20 unique one of said plurality of defect-adaptive memory devices, and selectively storing parity
21 information needed for data recovery obtained from said first region of a corresponding single
22 unique one of said plurality of defect-adaptive memory devices in a predetermined corre-
23 sponding single unique one of said plurality of caches.

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24 4 (previously presented). The memory system of claim 3, wherein parity information
25 for data recovery is modified to a value obtained through a calculation of new data recovery
26 information.

1 5 (previously presented). The memory system of claim 4, wherein parity information
2 for data recovery is obtained by performing an exclusive-OR operation on previous data, parity
3 information corresponding to the previous data, and new data.

1 6 (currently amended). A redundant array of inexpensive disks (RAID) level 5 system,
2 comprising:

3 a plurality of disk drives, each of said plurality of disk drives including a first
4 region having a plurality of data blocks for storing data and a second region having a

5 predetermined number of parity blocks for storing parity information for data recovery with the
6 parity information needed for data recovery is stored and is sequentially arranged from the
7 most outer cylinder on a recording medium in each corresponding one of said plurality of
8 defect-adaptive memory devices;

9 a plurality of caches, each of said plurality of caches respectively coupled opera-
10 tively to a corresponding single unique one of said plurality of disk drives, each of said caches
11 adapted for storing parity information for data recovery; and

12 a controller adapted to provide one-to-one caching, said controller operatively
13 coupled to each disk drive of said plurality of disk drives and to each corresponding single
14 unique cache of said plurality of caches, said controller adapted for selectively controlling a
15 write operation of data and parity information for a data recovery in each corresponding disk
16 drive of said plurality of disk drives, said controller comprising:

17 a first means for selecting a single predetermined disk drive of said
18 plurality of disk drives upon receipt of a data writing instruction from a host computer;

19 a second means for reading old data from the single predetermined disk
20 drive of said plurality of disk drives;

21 a third means for determining whether old parity information corres-
22 ponding to the old data corresponding to the single predetermined disk drive of said
23 plurality of disk drives is accessed in a corresponding single unique cache of said
24 plurality of caches;

25 a fourth means for reading the old parity information from the single pre-

26 determined disk drive of said plurality of disk drives, upon the old parity information
27 corresponding to the single predetermined disk drive of said plurality of disk drives not
28 being accessed in the corresponding single unique cache of said plurality of caches, and
29 for then loading the corresponding single unique cache of said plurality of caches with
30 the old parity information;

G₁ 31 a fifth means for obtaining new parity information by performing an
32 exclusive OR operation on the old data, the old parity information and new data;

33 a sixth means for loading the corresponding single unique cache of said
34 plurality of caches with the new parity information; and

35 a seventh means for writing the new data in said region for storing data
36 in the single predetermined disk drive of said plurality of disk drives and writing the
37 new parity information in said another region for storing parity information in the
38 predetermined single disk drive of said plurality of disk drives,
39 whereby the data writing process is completed.

1 7 (currently amended). In a method of writing data to, and reading data from, a
2 redundant array of inexpensive disks (RAID) level 5 system, said method comprising steps for
3 sequentially storing information for data recovery in a first region of a disk with the parity
4 information needed for data recovery stored and sequentially arranged from the most outer
5 cylinder on a recording medium in each corresponding one of said plurality of defect-adaptive
6 memory devices, storing information comprising data in a second region of the disk other than

7 the first region, controlling writing and reading of information by means of an electronic
8 controller unit, and caching information for data recovery, *the improvement comprising* a step
9 for reducing overhead during a read operation for data recovery and thereby improving data
10 input-output performance.

1 8 (currently amended). The method of claim 7, wherein said step for reducing overhead
2 during a read operation for data recovery and thereby improving data input-output performance
3 comprises steps for:

4 (a) coupling each one of a plurality of caches to each corresponding one of a
5 plurality of disks, whereby each disk is coupled one-to-one to one cache;

6 (b) operatively coupling the caches to the controller;

7 (c) storing in each one of the plurality of caches information for data recovery in
8 the disk corresponding to the cache; and

9 (d) determining information for data recovery in a disk by using information for
10 data recovery stored in the cache corresponding to the disk.

1 9. (New) A redundant memory system, comprising:

2 a plurality of defect-adaptive memory devices disposed in a redundant array of
3 inexpensive disks accommodating storage of data and parity information representative of the
4 data per sector across all of said memory devices within said array, with each of said plurality
5 of memory devices having a first and most readily accessible region disposed to sequential

6 store the parity information in sequential arrangement in said first region and a second region
7 for storing the data;

8 a plurality of caches, each of said plurality of caches respectively coupled
9 operatively to a corresponding single unique one of said memory devices to store the parity
10 information for the corresponding single unique one of said memory devices; and

11 a controller operatively coupled to each defect-adaptive memory device of said
12 plurality of defect-adaptive memory devices and to each corresponding single unique cache of
13 said plurality of caches, selectively controlling writing and reading of parity information
G 14 needed for data recovery in said first region of each corresponding single unique one of said
15 plurality of defect-adaptive memory devices.

1 10. (New) The memory system of claim 9, comprised of said first region comprising a
2 most outer cylinder of a recording medium in each corresponding one of said memory devices.

1 11. (New) The memory system of claim 9, comprised of said controller:
2 selectively obtaining parity information needed for data recovery from said first region
3 of each corresponding single unique one of said plurality of defect-adaptive memory devices,
4 and
5 selectively storing parity information needed for data recovery obtained from said first
6 region of a corresponding single unique one of said plurality of defect-adaptive memory
7 devices in a predetermined corresponding single unique one of said plurality of caches.